^{120}Sn(^{48}Ti,4nγ) 1987Mo21

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen[#]	NDS 147, 1 (2018)	30-Nov-2017

1987Mo21: E=225 MeV. Measured Eγ, Iγ, $\gamma\gamma$ coin, $\gamma(\theta)$, $\gamma\gamma(\theta)$(DCO), γ(lin pol).

^{164}Hf Levels

Quasiparticle labels for neutrons:
A: (π=+,α=+1/2); $i_{13/2}$ orbital, ν5/2[642].
B: (π=+,α=−1/2); $i_{13/2}$ orbital, ν5/2[642].
C: (π=+,α=+1/2)$_2$; $i_{13/2}$ orbital, ν3/2[651].
E: (π=−,α=+1/2); $h_{9/2}$ orbital, ν3/2[521].
F: (π=−,α=−1/2); $h_{9/2}$ orbital, ν3/2[521].

E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]
0.0[&]	0$^+$	2303.2[&] *7*	10$^+$	4259.7[a] *9*	18$^+$	6671.0[c] *10*	24$^-$
210.7[&] *3*	2$^+$	2574.4[c] *6*	10$^-$	4333.6[b] *9*	17$^-$	7059.3[b] *11*	25$^-$
586.7[&] *5*	4$^+$	2697.0[b] *7*	11$^-$	4764.3[c] *9*	18$^-$	7441.1[c] *11*	26$^-$
1084.4[&] *6*	6$^+$	2870.0[a] *7*	12$^+$	4936.1[a] *10*	20$^+$	7455.3[a] *11*	26$^+$
1520.3 *6*	4$^-$[#]	2959.8[c] *7*	12$^-$	5007.5[b] *9*	19$^-$	7870.6[b] *11*	27$^-$
1613.7? *9*	4$^-$[@]	3154.0[b] *7*	13$^-$	5357.0[c] *9*	20$^-$	8290.0[c] *15*	(28$^-$)
1667.9[&] *6*	8$^+$	3208.5[a] *8*	14$^+$	5667.0[b] *10*	21$^-$	8433.4[a] *15*	28$^+$
1835.0[b] *6*	7$^-$	3491.8[c] *8*	14$^-$	5696.1[a] *10*	22$^+$	8761.6[b] *15*	(29$^-$)
1945.8[c] *6*	6$^-$	3676.2[a] *9*	16$^+$	5979.7[c] *10*	22$^-$	9213.5[c] *18*	(30$^-$)
2243.6[b] *6*	9$^-$	3698.8[b] *8*	15$^-$	6332.8[b] *10*	23$^-$	9723.6?[b] *18*	(31$^-$)
2300.5[c] *6*	8$^-$	4127.2[c] *8*	16$^-$	6541.7[a] *11*	24$^+$	10188.2?[c] *21*	(32$^-$)

[†] From least-squares fit to Eγ data.
[‡] From 1987Mo21, based on $\gamma(\theta)$, $\gamma\gamma(\theta)$ and γ(lin pol). See also Adopted Levels.
[#] 5$^-$ (1987Bl06).
[@] (4$^-$,5$^-$) (1987Bl06).
[&] Band(A): g.s. band,α=0.
[a] Band(a): AB band,α=0. This band is continuation of g.s. band, with a possible band crossing at 10$^+$.
[b] Band(B): AE band,α=1. Possible band crossing at 19$^-$, changing to ABCE.
[c] Band(b): AF band,α=0. The two negative-parity bands are signature partners. Possible band crossing at 16$^-$, changing to ABCF.

$\gamma(^{164}$Hf)

E$_\gamma$	I$_\gamma$	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[†]	Comments
210.7 *3*	110.7 *19*	210.7	2$^+$	0.0	0$^+$	(E2)	A$_2$=+0.32 *3*; A$_4$=−0.02 *6*
273.7 *3*	9.7 *2*	2574.4	10$^-$	2300.5	8$^-$	(Q)	A$_2$=+0.15 *8*; A$_4$=+0.13 *13*
331.0 *3*	10.2 *3*	2574.4	10$^-$	2243.6	9$^-$	D+Q	DCO=1.2 *4*
332.0 *3*	3.0 *3*	1945.8	6$^-$	1613.7?	4$^-$	(Q)	DCO=0.99 *26*
338.6 *3*	48.1 *6*	3208.5	14$^+$	2870.0	12$^+$	E2	A$_2$=+0.41 *3*; A$_4$=−0.05 *5*; DCO=1.11 *20* pol=+0.39 *6*.
354.8 *3*	8.4 *8*	2300.5	8$^-$	1945.8	6$^-$	Q	DCO=0.94 *18*
376.0 *3*	106.4 *15*	586.7	4$^+$	210.7	2$^+$	E2	A$_2$=+0.25 *2*; A$_4$=−0.02 *4* pol=+0.43 *4*.

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^{120}Sn(^{48}Ti,4nγ) 1987Mo21 (continued)

γ(^{164}Hf) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	Comments
385.4 *3*	17.8 *5*	2959.8	12^-	2574.4	10^-	(Q)	A_2=+0.31 *6*; A_4=−0.09 *10*
394.5 *3*	3.7 *2*	2697.0	11^-	2303.2	10^+	D	DCO=0.45 *10*
408.6 *3*	19.6 *4*	2243.6	9^-	1835.0	7^-	E2	A_2=+0.50 *7*; A_4=−0.13 *10*; DCO=1.00 *10* POL=+0.33 *9*.
425.6 *3*	4.0 *4*	1945.8	6^-	1520.3	4^-	Q	DCO=1.03 *22*
453.3 *3*	24.2 *7*	2697.0	11^-	2243.6	9^-	Q	DCO=0.93 *17* A_2=+0.20 *3*; A_4=−0.16 *6*
457.0 *3*	22.8 *8*	3154.0	13^-	2697.0	11^-	Q	DCO=0.90 *16*
465.3 *3*	6.5 *4*	2300.5	8^-	1835.0	7^-	M1+E2	A_2=+0.24 *6*; A_4=+0.001 *10*; DCO=1.10 *25* POL=+0.26 *9*.
467.7 *3*	42.3 *8*	3676.2	16^+	3208.5	14^+	E2	A_2=+0.26 *3*; A_4=−0.11 *5*; DCO=1.01 *15* Pol=+0.40 *7*.
497.7 *3*	100.0 *10*	1084.4	6^+	586.7	4^+	E2	A_2=+0.24 *2*; A_4=−0.04 *3* POL=+0.42 *3*.
532.0 *3*	15.2 *13*	3491.8	14^-	2959.8	12^-	Q	DCO=1.00 *26*
544.8 *3*	21.7 *15*	3698.8	15^-	3154.0	13^-	Q	A_2=+0.38 *7*; A_4=−0.05 *7*; DCO=1.00 *11*
566.8 *3*	56.6 *13*	2870.0	12^+	2303.2	10^+	E2	A_2=+0.35 *3*; A_4=+0.03 *5*; DCO=1.02 *8* POL=+0.62 *7*.
575.9 *3*	18.0 *5*	2243.6	9^-	1667.9	8^+	E1	A_2=−0.22 *5*; A_4=+0.01 *9*; DCO=0.43 *4* POL=+0.23 *5*.
583.5[‡] *3*	<119[‡]	1667.9	8^+	1084.4	6^+	(E2)	A_2=+0.29 *4*; A_4=−0.15 *6*; DCO=0.95 *12* POL=+0.43 *4* and DCO for doublet.
583.5[‡] *3*	<119[‡]	4259.7	18^+	3676.2	16^+	(E2)	
592.7 *3*	7.9 *10*	5357.0	20^-	4764.3	18^-	Q	DCO=0.86 *20*
622.7 *3*	7.3 *4*	5979.7	22^-	5357.0	20^-	(Q)	DCO=0.89 *20*
632.3 *3*	8.8 *8*	2300.5	8^-	1667.9	8^+	E1	A_2=−0.32 *7*; A_4=+0.03 *15*; DCO=0.8 *4* POL=+0.15 *5*.
634.8 *3*	20.7 *25*	4333.6	17^-	3698.8	15^-	Q	DCO=1.09 *17*
635.3 *3*	66 *4*	2303.2	10^+	1667.9	8^+	E2	A_2=+0.34 *5*; A_4=−0.09 *8*; DCO=0.93 *8* POL=+0.62 *5*.
635.4 *3*	11.7 *16*	4127.2	16^-	3491.8	14^-	Q	DCO=1.16 *25*
637.1 *3*	10.5 *18*	4764.3	18^-	4127.2	16^-		
659.5 *3*	9.0 *5*	5667.0	21^-	5007.5	19^-	(Q)	DCO=0.84 *16*
665.8 *3*	10.1 *5*	6332.8	23^-	5667.0	21^-	Q	DCO=1.2 *3*
673.9 *3*	15.9 *9*	5007.5	19^-	4333.6	17^-	Q	DCO=1.03 *21*
676.4 *3*	23.4 *7*	4936.1	20^+	4259.7	18^+	E2	A_2=+0.42 *4*; A_4=−0.32 *6*; DCO=0.90 *11* POL=+0.57 *12*.
691.3 *3*	5.8 *3*	6671.0	24^-	5979.7	22^-	Q	DCO=1.2 *3*
726.5 *3*	7.0 *4*	7059.3	25^-	6332.8	23^-	Q	DCO=0.94 *9*
750.5 *3*	22.3 *8*	1835.0	7^-	1084.4	6^+	E1	A_2=−0.22 *3*; A_4=−0.01 *5*; DCO=0.57 *8* POL=+0.29 *3*.
759.9 *3*	20.6 *6*	5696.1	22^+	4936.1	20^+	E2	A_2=+0.39 *9*; A_4=+0.07 *10*; DCO=0.85 *7* POL=+0.66 *12*.
770.1 *3*	5.1 *3*	7441.1	26^-	6671.0	24^-	(Q)	DCO=1.0 *4*
811.3 *3*	5.2 *3*	7870.6	27^-	7059.3	25^-	Q	DCO=1.1 *3*
845.6 *3*	13.6 *7*	6541.7	24^+	5696.1	22^+	(Q)	DCO=0.85 *20*
848.9 *3*	3.6 *4*	8290.0	(28^-)	7441.1	26^-		
862.9 *3*	4.5 *4*	1945.8	6^-	1084.4	6^+	(D)	DCO=0.74 *33*
891.0 *3*	4.3 *5*	8761.6	(29^-)	7870.6	27^-	Q	DCO=1.2 *3*
913.6 *3*	8.6 *7*	7455.3	26^+	6541.7	24^+	Q	DCO=0.97 *16*
923.5 *3*	2.7 *2*	9213.5	(30^-)	8290.0	(28^-)		
933.6 *3*	6.5 *7*	1520.3	4^-	586.7	4^+		
962.0[#] *3*	2.2 *4*	9723.6?	(31^-)	8761.6	(29^-)		
974.7[#] *3*	2.2 *2*	10188.2?	(32^-)	9213.5	(30^-)		
978.1 *3*	3.9 *5*	8433.4	28^+	7455.3	26^+		

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^{120}Sn(^{48}Ti,4nγ) 1987Mo21 (continued)

$\gamma(^{164}Hf)$ (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Comments
1027.0[#] *3*	2.9 *5*	1613.7?	4^-	586.7	4^+	E_γ: this γ may be the same as a weak 1029.3γ in 1987Bl06 placed tentatively from 34^- to 32^-.

† Based on $\gamma(\theta)$, $\gamma\gamma(\theta)$(DCO) and γ(lin pol) data. 1987Mo21 assign E2 for Q, E1 for pure dipole, and M1+E2 for D+Q.
‡ Multiply placed with undivided intensity.
# Placement of transition in the level scheme is uncertain.

^{120}Sn(^{48}Ti,4nγ) 1987Mo21

Level Scheme

Intensities: Relative I_γ

& Multiply placed: undivided intensity given

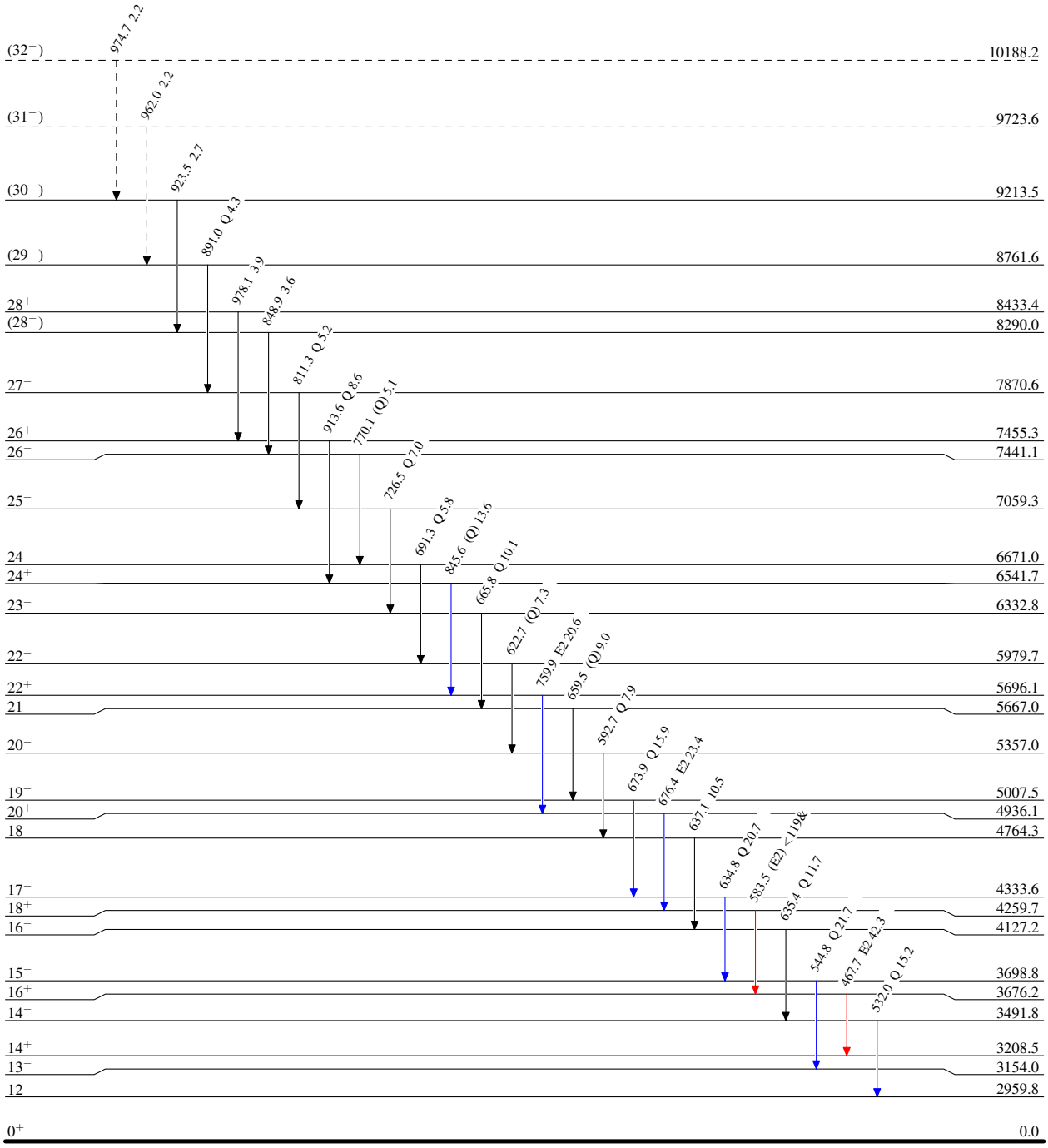
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



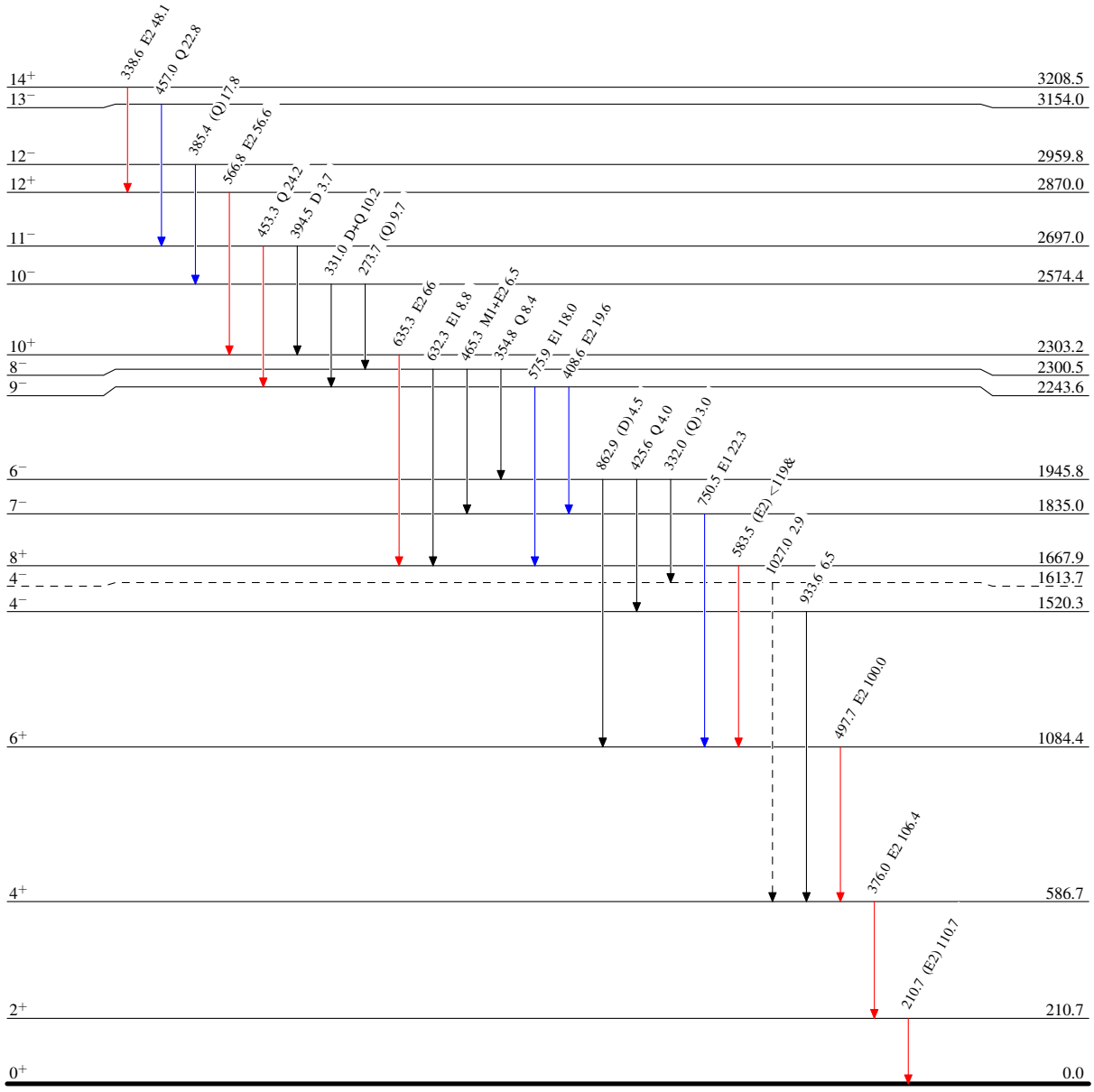
$^{164}_{72}Hf_{92}$

^{120}Sn(^{48}Ti,4nγ) 1987Mo21

Level Scheme (continued)

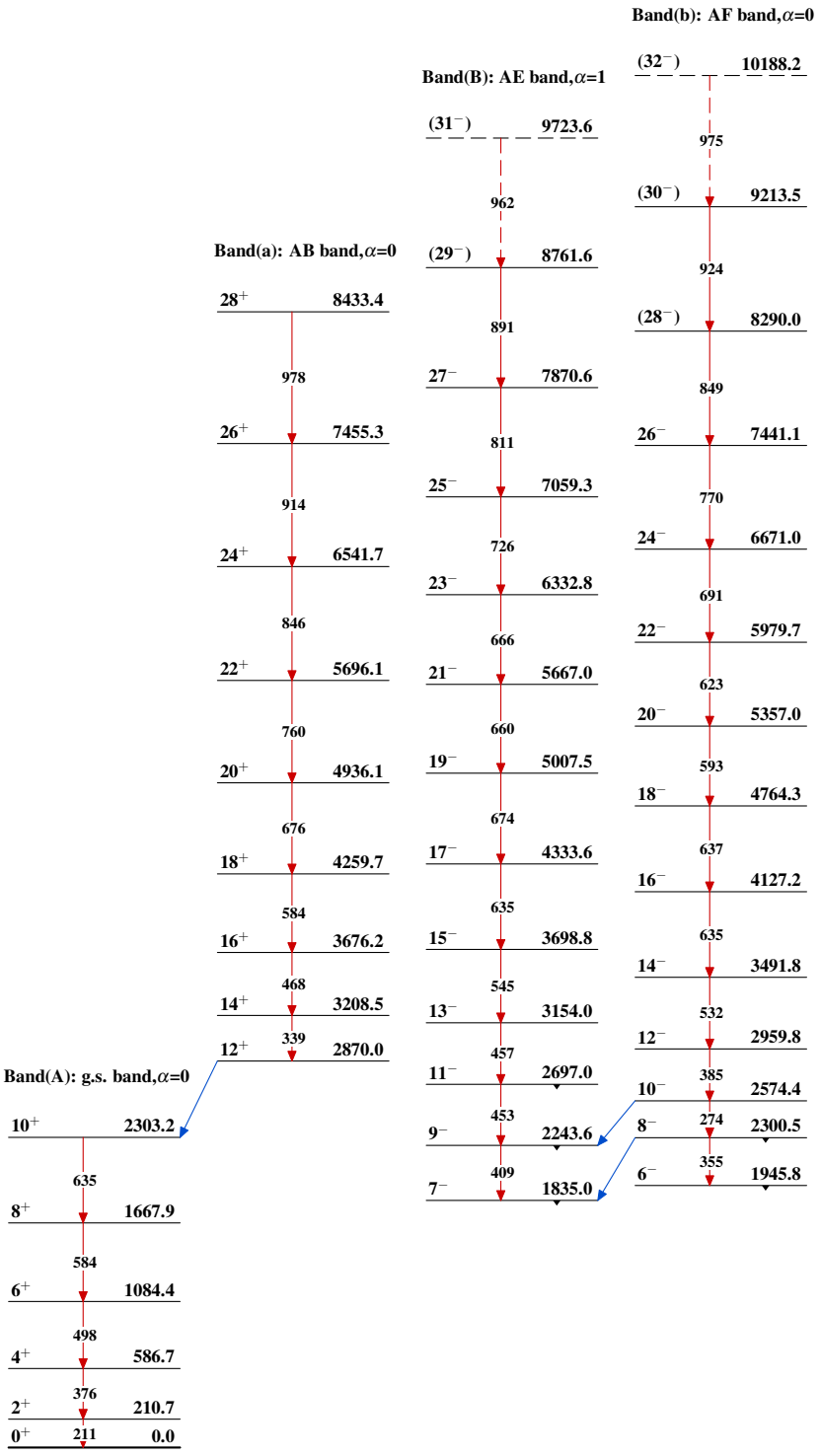
Intensities: Relative I_γ
& Multiply placed: undivided intensity given

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



$^{164}_{72}Hf_{92}$

^{120}Sn(^{48}Ti,4nγ) 1987Mo21



$^{164}_{72}Hf_{92}$